

National Aeronautics and Space Administration
Commercial Space Committee
of the
NASA Advisory Council

June 17, 2010
NASA Headquarters
Washington, DC

Meeting Minutes

John Emond
Executive Secretary
Commercial Space Committee

Bretton Alexander
Chair, Commercial Space Committee

*Meeting report prepared by
Jill Hacker*

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John Emond opened the meeting at 1 pm. The meeting was an open meeting under the Federal Advisory Committee Act. It was a deliberation, with no audience participation in the proceeding.

Mr. Emond introduced Bretton Alexander, committee chair.

Mr. Alexander had made a list of topics to discuss, including some that had been sent to him by Commercial Space Committee (CSC) members via e-mail. He stated his intent to discuss each topic to the point of consensus on its meaning and then assign each one to a committee member to develop final wording for a paragraph about it. CSC would then finalize the paragraphs before the next meeting of the NASA Advisory Council (NAC) on August 4 at the Jet Propulsion Laboratory in Pasadena, CA. This real-time deliberation and editing was the sole agenda item for the afternoon meeting.

The topics were in three categories: observation, finding, and recommendation. Mr. Alexander explained that Ken Ford, NAC chairman, had asked that each topic be classified in just one of those categories.

Mr. Alexander noted that the next CSC meeting will be a fact-finding meeting, not open to the public, on July 8 at Kennedy Space Center. There is a plan for a deliberation meeting in late July that will be open to the public to finalize the observations, recommendations, and findings.

Mr. Alexander said CSC had made one formal submittal to the NAC: an observation about the progress of the Commercial Orbital Transportation Services (COTS) program.

Mr. Alexander showed a list of topics to be discussed:

- Use of Space Act agreements
- Defining the NASA market
- Business case
- Concept of operations
- Use of government-furnished resources
- Step-wise transition to fully commercial

Patti Grace Smith commented that the list should include issues that will have to be worked out between NASA and FAA, including human rating and insight/oversight. Mr. Alexander added “FAA licensing” and “commercial human rating plan” to the list.

The first topic discussed was business case.

The following proposed wording was discussed:

Business Case

The Council finds that the underlying business case for companies proposing to provide crew transportation needs amplification. The basis for NASA’s new direction for crew and cargo is commercial companies that through NASA and non-NASA business will be self-sustaining. The business case, particularly for commercial crew, has not been adequately explained.

Lon Levin explained that it is not clear whether or not there is a business case for the program. He suggested that NASA should examine the question, including the projection of market demand. Mr. Levin explained further that with this statement, without judging whether a business case exists or not, NASA is stating that there is a new direction, whose basis is that the companies involved will ultimately be self-sustaining. Customers will be a combination of NASA and others.

Major General Donald Hard commented that NASA needs to clarify its expectations about market demand and business cases for commercial crew, to be sure they are on the right path. It needs to articulate these expectations to the public and Congress.

Mr. Levin commented that the commercial space effort represents new path for NASA. With low-Earth orbit (LEO) becoming commercial-service based, it would make sense to do some due diligence to flesh out that vision with business analysis. NASA has a vision; CSC advises NASA; NASA must do due diligence.

Wilbur Trafton asked what will happen if the business case doesn’t close for any company that proposes. In reply, Mr. Alexander cited the example of Commercial Orbital Transportation Services (COTS), for which there was a viable alternative,

Soyuz, so NASA was not forced to accept any proposal. He said NASA is already committed to the commercial space path, because the president has committed to it. Mr. Levin replied that NASA still needs to know whether it can meet the plan. Several people commented that that is different from doing due diligence.

Ms Smith commented that her interpretation of the proposed recommendation was that there is a vision; now the question is what to do to accomplish it. Companies are saying they cannot participate because they do not know what the required pieces are. NASA needs to inform its vision with a business plan that lays out specifically what its needs and requirements are going to be; then the due diligence that follows is companies informing NASA of their capabilities vis a vis the requirements. Mr. Alexander expressed skepticism about whether NASA has the capability to make the necessary evaluation. Dr. Bernard Harris agreed that that expertise needs to be in place; it can be developed or bought.

Ms Smith asked if there is more to the business case than determining whether a company has the financial wherewithal to do the business. Mr. Levin replied that there are many factors. For individual business plans, Ms Smith suggested looking at the companies' financials to see whether they have the money to do the work. Mr. Levin commented that the issue is whether there is sufficient market to continue to invest. Ms Smith replied that when the Federal Communications Commission was doing cellular [? Licensing cellular companies?] they looked at companies' financials. Mr. Levin replied that NASA's position in commercial space now is analogous not to licensing, but to deciding whether to allocate the spectrum to a particular business.

Mr. Alexander commented that NASA now has many voices, each with a different expectation about what *commercial* means and what the market is going to be. NASA needs a unified statement of its expectations, needs to clarify its expectation for NASA and non-NASA markets so businesses can construct an approach around that. Proposals will need to be evaluated against that expectation. When proposals come in, either what best meets the expectation will be selected or nothing will be selected, as is done in the COTS program.

Mr. Levin suggested that to help NASA develop more unified expectations, CSC list evaluation factors to consider.

Mr. Trafton commented that a company that offers crew services would not have enough cost and revenue information to make a decision about whether to propose. Mr. Alexander replied that because of the high cost of crew services – about a billion dollars per flight – there must be companies for which the business case would close. At the same time, NASA has an expectation that other markets would bear part of the burden for development costs.

John Michael Lounge asked how NASA can convince a supplier to participate, considering the risk of doing business with the government. He expressed a fear that NASA will look at the problem too narrowly and may miss something valuable

that could be gained from a holistic approach. Referring to a prior discussion, General Hard asked if the vision expressed was not supported throughout NASA. Mr. Alexander replied that that vision is long-term and the first step could be the commercial crew program, with NASA the anchor tenant, or maybe the only tenant, for 5 or 10 years. Or the first step could be that the commercial side of the program is three times the size of the government program from the start, and puts in three times the money the government puts in.

Mr. Alexander ended the discussion of business case. The tentative wording of the recommendation is:

Business Case

- *NASA needs to clarify and enunciate its expectations regarding the NASA and non-NASA markets for commercial space transportation capabilities, in particular commercial crew, and construct a programmatic and business approach that is consistent with those expectations.*
- *NASA currently has many voices with different expectations of what the NASA and non-NASA markets are for commercial space transportation services, including crew, cargo and traditional spacecraft launch.*
- *In addition, NASA will need appropriate expertise to evaluate company business plans during the source selection process.*
- *NASA needs to understand the advantages and disadvantages of multiple providers, such as competition and the impact of low launch rates on reliability, safety, and cost.*

Mr. Levin offered to work on the wording.

The next topic discussed was defining the NASA market. The following proposed wording was discussed:

Defining the NASA Market

The Council recommends that NASA assess and define the traffic requirements for crew transport to and from the International Space Station (ISS) for commercial crew providers. The number of flights and/or seats per year purchased by NASA on commercial spaceflight vehicles has a significant impact on the business plans and availability of private investment for commercial providers. As such, it is important for NASA to clearly define the expected ISS market prior to issuing a solicitation for a Commercial Crew Transportation program.

Mr. Alexander explained that this recommendation asks NASA to understand how the commercial space effort changes NASA's concepts of operations and how NASA might take advantage of that, to flesh out what is expected to happen. Mr. Lounge said NASA has not thought about how to take advantage of a reliable, robust commercial transportation system to get the most out of their infrastructure.

General Hard commented that for the launch vehicle, demand and its impact on launch rate are important. Reliability seems to have an iron bar relationship to launch rate.

Mr. Lounge raised the possibility of having multiple suppliers. That would entail additional cost, but it would also bring benefits. There was discussion about whether this issue belongs in this paragraph or perhaps another one. Mr. Alexander added that it can affect competition. Mr. Levin noted that launch rates could affect reliability, safety, and cost.

Mr. Alexander offered to polish the recommendation's wording. The following wording was agreed to as a draft:

Defining the NASA Market

- *The Council recommends that NASA assess and define the NASA traffic requirements for crew transport to and from the International Space Station (ISS) and other LEO destinations. The number of flights and/or seats per year purchased by NASA on commercial spaceflight vehicles has a significant impact on the business plans and availability of private investment for commercial providers. As such, it is important for NASA to clearly define the expected ISS market prior to issuing a solicitation for a Commercial Crew Transportation program.*
- *NASA has not thought about how to take advantage of a reliable, safe, robust space transportation capability to get the most out of its infrastructure*
- *Mixing crew and cargo*

The next topic discussed was concept of operations and acquisition approach. The paragraph being deliberated was:

Concept of Operations

The Council recommends that NASA should specify a min and a max number of seats to and from the ISS they would purchase from each selected provider under the service contract, and let the bidders structure the offer that best fits their (the offerer's) business model. The solicitation should not mandate the concept of operations, the

frequency of launch, or the number of crew to be transported on each launch. It should let industry respond with capability based offers. Allowing commercial crew service providers this extra level of design freedom will facilitate the long term goal of a sustainable and robust commercial LEO transportation industry that can support NASA's long term exploration enterprise.

General Hard raised the question of what will happen in the new acquisition paradigm if NASA requires a change from something a company does. He said the issue is how NASA influence will be effectively applied to the design, development, and operation of commercial capability as regards safety requirements and certifications.

Mr. Lounge referred to the Commercial Resupply Services (CRS) program, in which no offeror was required to perform beyond its present capabilities; each was asked to bid only what it felt comfortable doing. The approach was "We've got a need overall. How much of that do you want to bite off?" Mr. Lounge suggested creating a capability-based proposal, rather than a totally prescriptive one. This flexibility might result in more efficient concepts of operations. Mr. Alexander pointed out that offerors offer only what a proposal asks for. Responses to overly specific requirements will never indicate what else a company can do.

Mr. Levin suggested that NASA should reevaluate its concept of operations. It was agreed to change the name of the topic to "Concept of Operations and Acquisition Approach." It was agreed that the advantages and disadvantages of multiple providers should be covered under business case.

Mr. Lounge agreed to work on the paragraph on Concept of Operations and Acquisition Approach. The new draft reads as follows:

Concept of Operations and Acquisition Approach

- *NASA should reevaluate the ISS conops given commercial transportation capabilities.*
- *The Council recommends that NASA should specify a min and a max number of seats to and from the ISS they would purchase from each selected provider under the service contract to provide flexibility to the bidder to structure the offer that best fits their (the offerer's) business model. The solicitation should not mandate the concept of operations, the frequency of launch, or the number of crew to be transported on each launch. It should let industry respond with capability based offers. Allowing commercial crew service providers this extra level of design freedom will facilitate the long term goal of a sustainable*

and robust commercial LEO transportation industry that can support NASA's long term exploration enterprise.

The next topic discussed was the use of Space Act agreements. The initial wording of the finding was:

Use of Space Act Agreements

The Council finds that the use of Space Act Agreements (SAAs) is appropriate for the proposed Commercial Crew Transportation program to develop and demonstrate commercial capabilities for the delivery of astronauts to and from the International Space Station. The use of Space Act Agreements is appropriate because the program is envisioned as a public-private partnership, in which both parties provide funding, to develop capabilities that will serve both government and private sector markets.

This paragraph is a finding, not an observation or a recommendation: The CSC recognizes that it is appropriate for NASA to use Space Act Agreements if NASA chooses to do so.

There was some discussion about how Space Act Agreements (SAAs) work. Mr. Alexander explained that SAAs facilitate commercial. Because transportation to the International Space Station (ISS) is already provided by Soyuz, it is not essential. That makes it appropriate for an SAA. Mr. Levin agreed that if NASA has an alternative, an SAA may be appropriate, but he questioned whether this would apply to transportation to the ISS. Soyuz is available, but is there a mandate for the United States to provide transportation to and from the ISS? General Hard replied that with the Obama Administration's emphasis on international cooperation, U.S.-provided transportation may not be a mandate.

In response to a member's question about why the CSC was commenting on SAAs, Mr. Alexander explained that the CSC had been asked to provide advice on NASA's strategy for commercial space generally, commercial crew specifically. To the extent that the CSC has consensus, its opinion may be timely, relevant advice to the Administrator. Mr. Emond added that the CSC has the opportunity to identify dynamic tensions where they exist. This is an arms-length relationship and others may not be able to voice one position or the other in the way CSC can.

Mr. Alexander proposed changing this finding to an observation; he said the choice between SAA and contract vehicle is important in how an arrangement will play out. He explained that an SAA differs from a procurement in that an SAA is owned and operated by industry to serve both government and commercial purposes. In the end a capability developed under an SAA would not be a government capability.

The draft wording agreed to was as follows:

Use of Space Act Agreements

The Council finds that the use of Space Act Agreements (SAAs) is appropriate for the proposed Commercial Crew Transportation program to develop and demonstrate commercial capabilities for the delivery of astronauts to and from the International Space Station. The use of Space Act Agreements is appropriate because the program is envisioned as a public-private partnership, in which both parties provide funding, to develop capabilities that will be owned and operated by the private sector to serve both government and private sector markets. In addition, SAAs allow flexibility in the development of capabilities.

Mr. Alexander offered to polish the wording for the rationale.

Mr. Emond discussed the schedule. These observations, findings, and recommendations for the NAC will not be completed before the July meeting. The CSC could finalize them during the late-July CSC meeting so that they would be ready in time for the NAC's August meeting.

The next topic discussed was step-wise transition to fully commercial services. The initial draft wording was:

Step-wise Transition to Fully Commercial

The Council recommends that instead of mandating that the transition to commercial services occur in a single step, NASA should consider an approach that allows commercial service providers to gradually prove themselves capable delivering of safe and reliable services before taking over the entire earth to LEO transportation mission.

Mr. Alexander referred to a prior discussion in which NASA had indicated that it would be open to an arrangement in which commercial providers use NASA flight operations. A provider can ask NASA to fill in certain roles.

General Hard suggested a phased approach. Mr. Alexander expressed doubt about whether a hybrid approach could be successful, because such an approach might not support the goal of developing a truly commercial capability that would enable other markets to be developed.

Mr. Lounge questioned the feasibility of achieving, in five years, a full-blown commercial model in which the commercial service provider is responsible for every part of the mission. Mr. Alexander explained that the vision is that in five years there is still NASA oversight at every step. The program becomes the

company's responsibility, but NASA is a go/no go gate at every stop. The end state, to be achieved at some later date, is that NASA simply buys tickets. Dr. Harris saw it as NASA going from a government agency to a commercial agency. General Hard saw the transition as NASA moving from a "Mother may I" culture to "Let us use our [NASA's] expertise to help you [the commercial provider] develop capability."

Mr. Levin articulated that while there was agreement that the transition would be challenging, there was no consensus about its speed and whether the approach should be stepped. General Hard suggested making a general statement that it might be worthwhile to explore other approaches. CSC needs to clarify what NASA's role is. Mr. Lounge commented and several committee members agreed that NASA is to be more than an observer.

Mr. Trafton commented that NASA is trying to avoid a serious accident. This can be done if NASA people are involved, making use of their experience and facilities.

Mr. Lounge questioned the assumption that the program has to change business models as soon as possible. He asked, too, what NASA's role will be after the transition, what NASA's exploration architecture is and how it is consistent with commercial service.

Ms Smith agreed to work more on the paragraph.

The draft wording that was agreed on was:

Transition Plan

The Council recommends that NASA develop a plan to transition from government-owned and operated access to LEO to privately owned and operated commercial human spaceflight to LEO. This transition plan should address NASA's role and contribution and that of commercial industry. A successful transition to a commercial paradigm for human spaceflight involves the participation of both the commercial providers and NASA. NASA should determine what resources, knowledge and expertise, and infrastructure it should provide to support the transition to commercial. In addition, NASA should consider the role of commercial transportation services in its architecture for exploration beyond LEO.

What will NASA's role be, in what areas, and for how long?

Next, the discussion turned to government-furnished equipment. The original draft wording of the paragraph was as follows:

Use of Government Furnished Resources

The Council observes that:

- *NASA has many assets (elements of prior programs' flight and ground systems, communications, mission control and launch infrastructure) and expertise that should be made available to commercial crew (and cargo?) service providers.*
- *Use of those assets and expertise could significantly reduce risks in developing and operating commercial earth to LEO transportation services.*
- *However, given that the long term goal of the Administration's civil space policy is to facilitate development of a safe, reliable and sustainable commercial space industry for earth to LEO transportation in support of current and future NASA programs, NASA must be careful not to mandate or allow use of those government owned assets and expertise in a way that discourages competition, innovation, and private investment. They should be used to reduce cost, schedule and/or performance risks in the development and operations of commercial/private company capabilities.*

This issue is closely related to the transition issue and becomes the rationale for the transition plan. General Hard pointed out that the assets may include future assets as well.

The draft wording agreed to was:

Use of Government Furnished Resources

• ***Rationale for Transition Plan:***

• *The Council observes that:*

- *NASA has many assets (elements of prior programs' flight and ground systems, communications, mission control and launch infrastructure) and expertise that should be made available to commercial crew (and cargo?) service providers.*
- *Use of those assets and expertise could significantly reduce risks in developing and operating commercial earth to LEO transportation services.*
- *However, given that the long term goal of the Administration's civil space policy is to facilitate development of a safe, reliable and sustainable commercial space industry for earth to LEO transportation in support of current and future NASA programs, NASA must be careful not to mandate or allow use of those government owned assets and expertise in a way that discourages competition, innovation, and private investment. They should be used to reduce cost, schedule and/or performance risks in the development and operations of commercial/private company capabilities.*

Next discussed was the Commercial Human Rating Program (CHRP). This was a new topic, with no draft wording to work from.

Mr. Levin said there were two issues with CHRP: the rate at which it is being completed and the substance. Mr. Alexander replied that the plan is being done on course and there is no need for CRS to comment on the schedule. Substance is being handled by Eileen Collins. CSC does not have the expertise to be involved in the issue. Responses from industry were due the next day, June 18. Mr. Emond suggested that the CSC meeting planned for July would be an opportunity to discuss industry's responses. Mr. Levin commented that the human rating issue has long been an impediment to commercial space flight. Mr. Alexander agreed that the human rating issue is huge. The requirements must be known before the proposal process begins, so that prospective proposers can factor it in.

There was discussion about whether to seek joint activity with Space Operations on CHRP. Mr. Emond commented that because the two groups have different perspectives, there is value added. He said Ms Collins is favorably inclined toward a meeting between the two committees.

Mr. Alexander asked whether CSC needs a series of briefings on the commercial rating approach/plan by the people involved. The consensus seemed to be that they do, but not yet.

Mr. Trafton agreed to work on the paragraph. The draft wording is as follows:

Commercial Human Rating Plan

- *Review Space Ops OFR prior to release*
 - *Possible joint meeting to discuss OFR*
 - *Seek joint O/F/R with SpaceOps/Collins (they draft 1st)*
- *Commercial committee examine implementation impact on commercial providers*
 - *After comments from RFI, get briefing from McAlister on comments and revision to CHRP*

Next, the discussion turned to FAA licensing, also a new topic.

General Hard stated his opinion that there is necessarily overlap between the FAA and NASA programs; the question is how to make that overlap efficient. It should be done in a partnership. Mr. Levin pointed out that there is no dialogue of substance between NASA and FAA at present; he thought CSC should encourage one. Ms Smith suggested instead that differences between the programs should be worked out as they are found. Mr. Levin said having two different safety standards remains an option. Ms Smith agreed that there can be two safety standards but they must be

harmonized or there will be disconnects all over the system. The specific areas of potential conflict have not yet been identified. Mr. Levin suggested that CSC should state that one consistent set of standards is needed.

Mr. Alexander suggested a recommendation that FAA license this activity and that NASA engage with FAA. In this arrangement there would be no competing, but there would be some deconfliction to be done.

Ms Smith said that by law FAA is in charge of commercial launches. Mr. Alexander replied that NASA can lawfully make a determination that FAA licensing is not needed. Ms Smith said that would put NASA into direct conflict with the statute. Mr. Alexander explained that one set of rules is needed.

Someone [Brett's notes say "Will Trafton to draft," but I heard Brett say, "You get this one, Patti.] agreed to work further on the recommendation's wording. The draft wording is:

FAA Licensing

- *The Council recommends that commercial crew demonstration and service flights be FAA licensed.*
- *NASA should engage with the FAA immediately to begin discussion of the implementation of FAA licensing of Commercial Crew.*
- *There's overlap, need to make efficient, work to do*

Mr. Alexander asked members to return their input some time before the July 4 weekend. Mr. Emond suggested Friday, July 2. Mr. Alexander asked members to make their submittals to the whole committee and make sure to include Mr. Emond.

Mr. Emond officially concluded the meeting at 5:02 pm.

Mr. Emond thanked members for their participation. Members thanked Mr. Alexander for a good meeting.

Appendix B Committee Membership

Bretton Alexander, Committee Chair
President, Commercial Spaceflight Federation

John Emond, Executive Secretary
Innovative Partnerships Program/Office of Chief Technologist
NASA Headquarters

Major General Donald Hard
U.S. Air Force (retired), independent consultant

Dr. Bernard Harris
CEO, Vasalius Ventures
Former astronaut, former SPACEHAB executive

Lon Levin, Committee Vice Chair
Co-founder, XM Satellite Radio and other satellite businesses

John Michael Lounge
Former astronaut; former Boeing executive

Patti Grace Smith
Former FAA Associate Administrator for Commercial Space Transportation
Independent consultant

Wilbur C. Trafton
Former NASA Associate Administrator for Space Flight
Former executive at ILS and Kistler Aerospace